

## **GEOLOGICAL DISTURBANCES**

### **VOLCANOES**

An active volcano occurs when magma (molten rock) reaches the earth's surface through a crack or vent in the crust. Volcanic activity can involve the extrusion of lava on the surface, the ejection of solid rock and ash, and the release of water vapor or gas (carbon dioxide or sulfur dioxide). Volcanoes commonly occur near plate boundaries where the motion of the plates has created cracks in the lithosphere through which the magma can flow. About eighty percent of volcanoes occur at convergent plate boundaries where subducted material melts and rises through cracks in the crust. The Cascade Range was formed in this way.

Volcanoes can be classified according to the type and form of their ejecta. The basic types are: composite volcanoes, shield volcanoes, lava domes, and cinder cones. Composite volcanoes are steep-sided, symmetrical cones built of multiple layers of viscous lava and ash.

Most composite volcanoes have a crater at the summit which contains the central vent. Lavas flow from breaks in the crater wall or from cracks on the flanks of the cone. Mt Fuji in Japan and Mt Ranier in Washington are examples of composite volcanoes.

Shield volcanoes are built almost entirely of highly fluid (low viscosity) lava flows. They form slowly from numerous flows that spread out over a wide area from a central vent. The resultant structure is a broad, gently sloping cone with a profile like a warrior's shield. Mt Kilauea in Hawaii is an example of a shield volcano.

Cinder cones are the simplest type of volcano. They form when lava blown violently into the area breaks into small fragments that solidify and fall as cinders. A steep-sided cone shape is formed around the vent, with a crater at the summit. Sunset Crater in Arizona is a cinder cone that formed less than a thousand years ago, disrupting the lives of the native inhabitants of the region.



Lava domes are formed when highly viscous lava is extruded from a vent and forms a rounded, steep-sided dome. The lava piles up around and on the vent instead of flowing away, mostly growing by expansion from within. Lava domes commonly occur within the craters or on the flanks of composite volcanoes.

## EARTHQUAKES

An earthquake occurs when built up strain in a rock mass causes it to rupture suddenly. The region where the rupture occurs is called the focus. This is often deep below the surface of the crust. The point on the surface directly above the focus is called the epicenter. Destructive waves propagate outward from the region of the quake, traveling throughout the earth. The magnitude of an earthquake is a measure of the total amount of energy released.

The first step in determining the magnitude is to measure the propagated waves using a device called a seismograph. Based on this information, the earthquake is given a number classification on a modified Richter scale. The scale is logarithmic, so a difference of one unit means a difference of ten-fold in wave intensity, which corresponds to an energy difference of 32-fold. The intensity of an earthquake is an indicator of the effect of an earthquake at a particular locale. The effect depends not only on the magnitude of the earthquake, but also the types of subsurface materials and the structure and design of surface structures.

Earthquakes generally occur along breaks in the rock mass known as faults, and most occur in regions near plate boundaries. Some 80 percent of all earthquakes occur near convergent plate boundaries, triggered by the interaction of the plates. Earthquakes are also often associated with volcanic activity due to the movement of sub-surface magma. When an earthquake occurs under the ocean, it can trigger a destructive tidal wave known as a tsunami.

